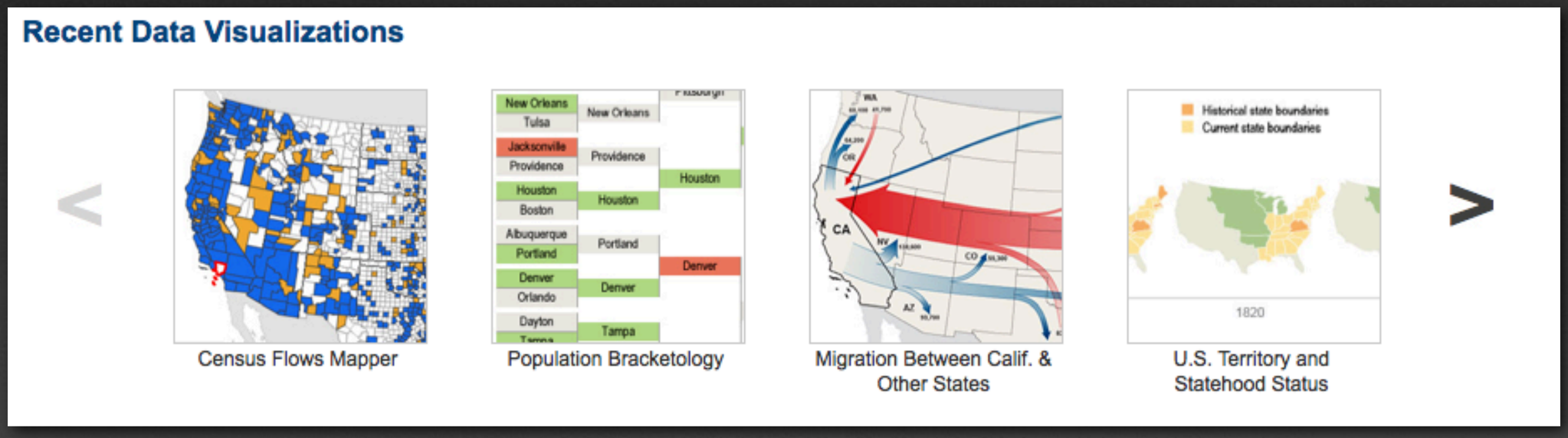
U.S. Census Bureau

Data Visualization of the Week

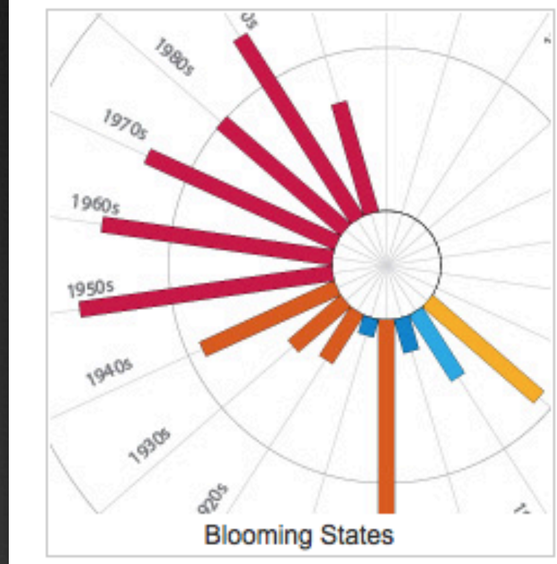


Alex Tait

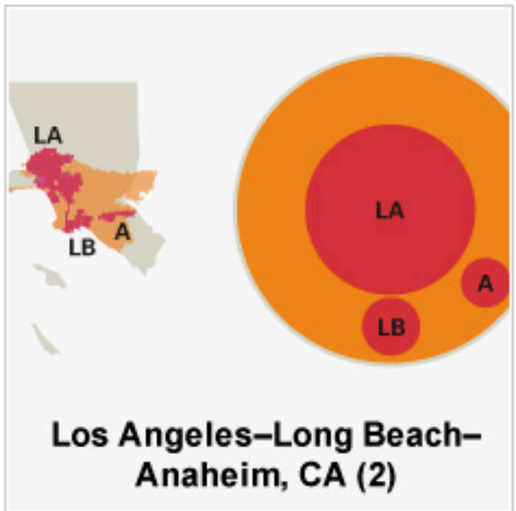
International Mapping, Ellicott City, MD

INTERNATIONAL MAPPING

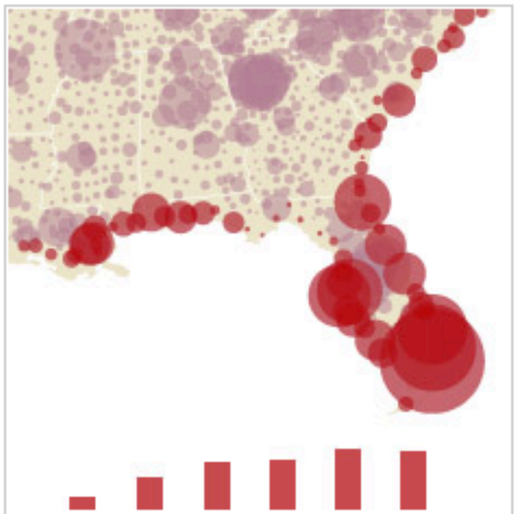
http://www.census.gov/dataviz/



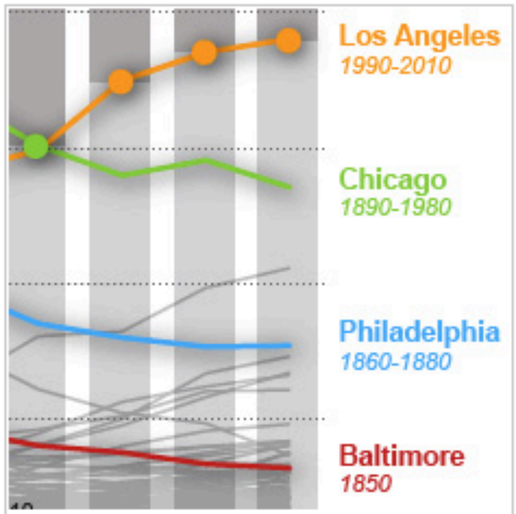
Blooming States



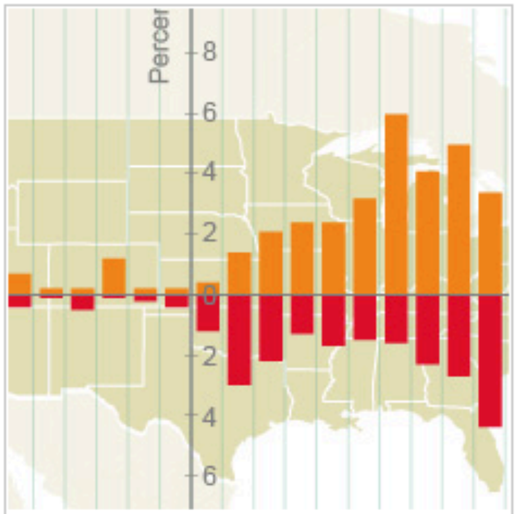
Largest Urbanized Areas


Coastline County Population

I-90 Population Density Profile, 2010



Keeping Pace with New York



Population Shift to the West and South

Data visualization parameters

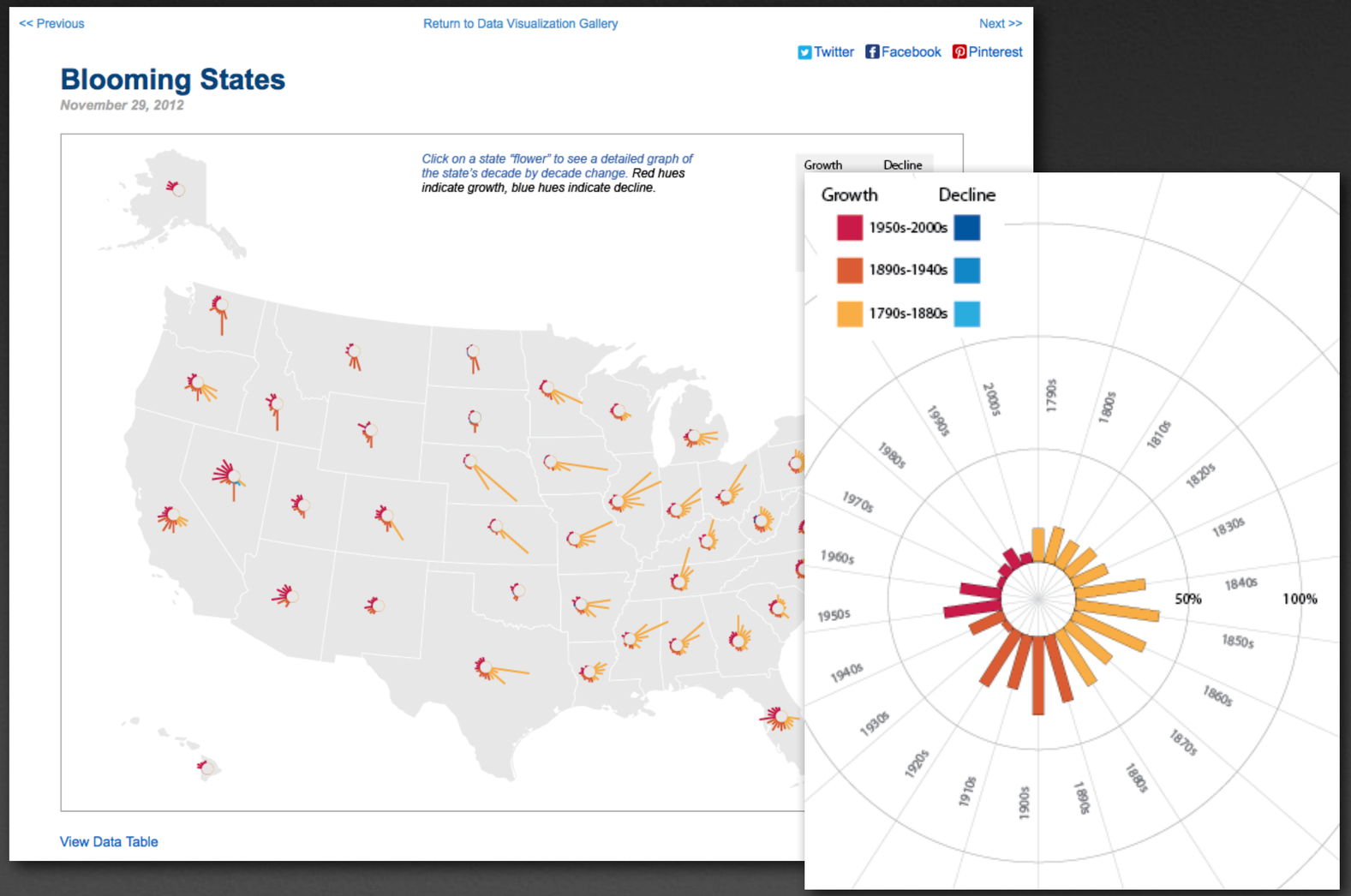
- Census data
- General audience
- Canvas size = 880 px by 660 pixel
- Compatible with Internet Explorer 7
- Compatible with Apple iOS devices

Implications for production process

- No Adobe Flash
- Javascript / HTML / Images
- Learn to love image swapping!
- Simple (or no) interactivity
- Keep focus on good visual ideas not cutting edge interactivity

How do we put one of these together?

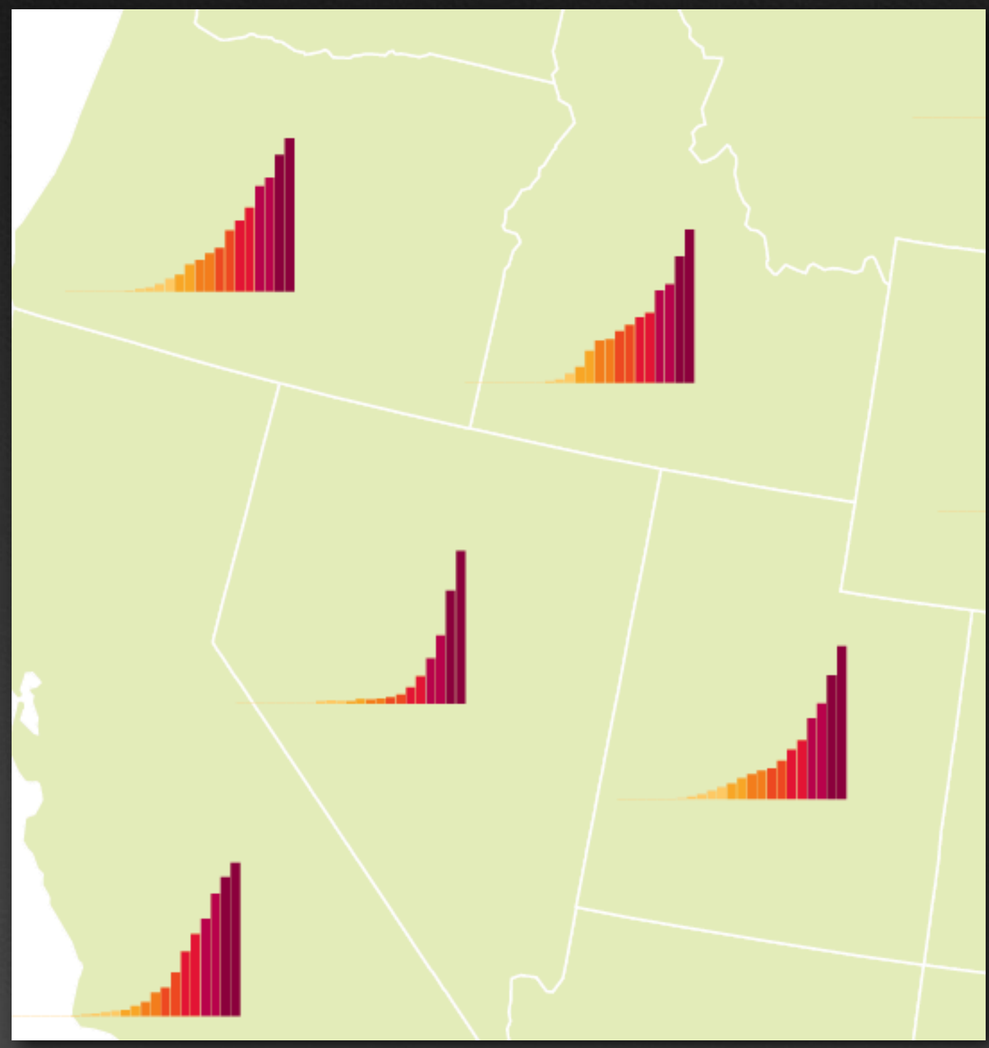
• Stages • Tools



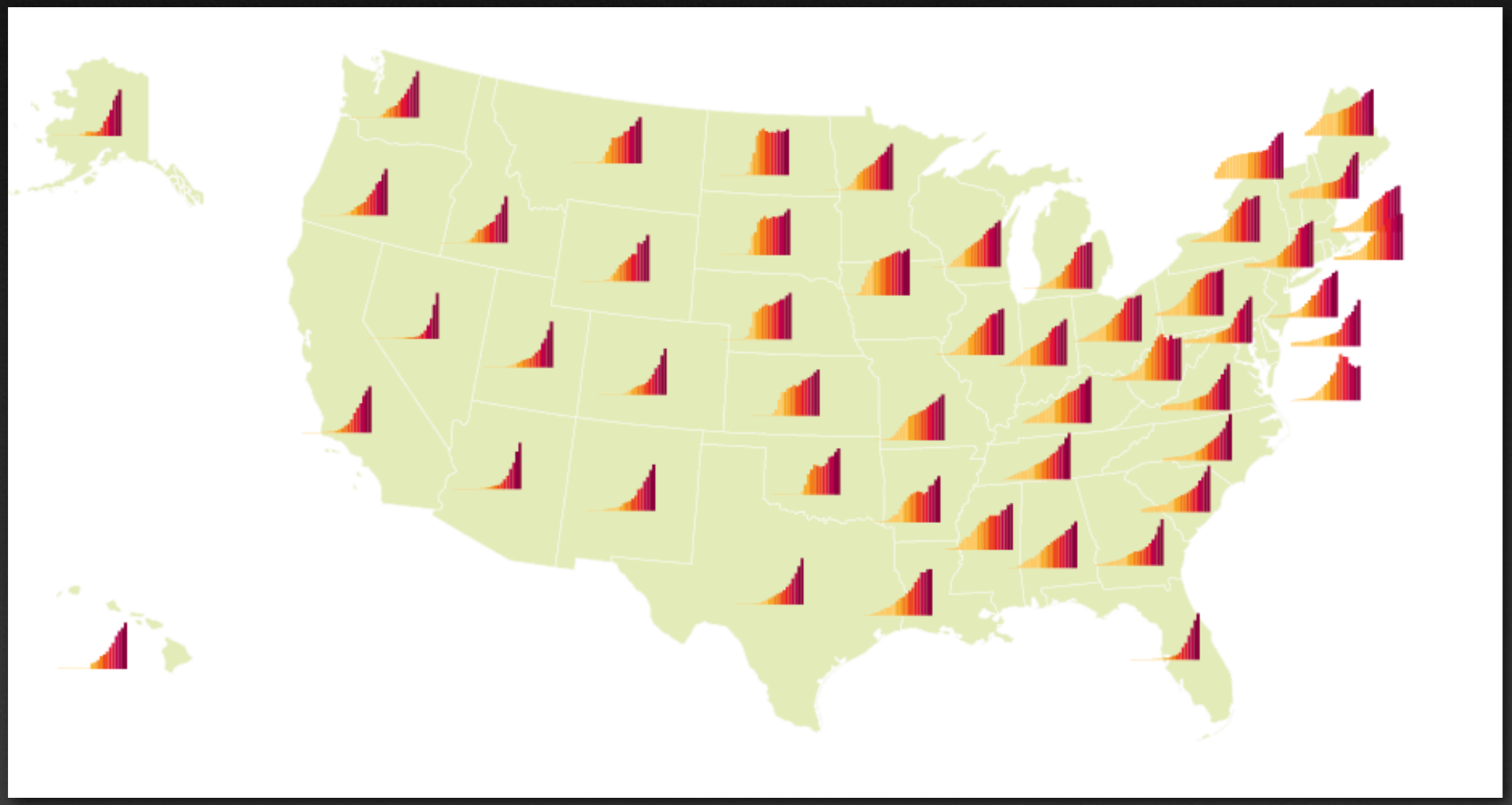
< explore 009 Blooming States >

1. Concept

Tools: Questions
Datasets
Images
Pencil & Paper
Voices
Experience



What does decade to decade change in population look like for all the states?



Refined question: How do we show regional differences in state population growth?

2. Data Preparation

Tools: Excel, ArcGIS

◇	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	State	1790	1800	1810	1820	1830	1840	1850	1860	1870	1880	1890	1900	1910
2	Alabama		1,250	9,046	127,901	309,527	590,756	771,623	964,201	996,992	1,262,505	1,513,401	1,828,697	2,138,093
3	Alaska										33,426	32,052	63,592	64,356
4	Arizona								6,482	9,658	40,440	88,243	122,931	204,354
5	Arkansas			1,062	14,273	30,388	97,574	209,897	435,450	484,471	802,525	1,128,211	1,311,564	1,574,449
6	California							92,597	379,994	560,247	864,694	1,213,398	1,485,053	2,377,549
7	Colorado								34,277	39,864	194,327	413,249	539,700	799,024
8	Connecticut	237,946	251,002	261,942	275,248	297,675	309,978	370,792	460,147	537,454	622,700	746,258	908,420	1,114,756
9	Delaware	59,096	64,273	72,674	72,749	76,748	78,085	91,532	112,216	125,015	146,608	168,493	184,735	202,322
10	District of Columbia		8,144	15,471	23,336	30,261	33,745	51,687	75,080	131,700	177,624	230,392	278,718	331,069
11	Florida					34,730	54,477	87,445	140,424	187,748	269,493	391,422	528,542	752,619
12	Georgia	82,548	162,686	251,407	340,989	516,823	691,392	906,185	1,057,286	1,184,109	1,542,180	1,837,353	2,216,331	2,609,121
13	Hawaii												154,001	191,909
14	Idaho									14,999	32,610	88,548	161,772	325,594
15	Illinois		2,458	12,282	55,211	157,445	476,183	851,470	1,711,951	2,539,891	3,077,871	3,826,352	4,821,550	5,638,591
16	Indiana		2,632	24,520	147,178	343,031	685,866	988,416	1,350,428	1,680,637	1,978,301	2,192,404	2,516,462	2,700,876
17	Iowa						43,112	192,214	674,913	1,194,020	1,624,615	1,912,297	2,231,853	2,224,771
18	Kansas								107,206	364,399	996,096	1,428,108	1,470,495	1,690,949
19	Kentucky	73,677	220,955	406,511	564,317	687,917	779,828	982,405	1,155,684	1,321,011	1,648,690	1,858,635	2,147,174	2,289,905
20	Louisiana			76,556	153,407	215,739	352,411	517,762	708,002	726,915	939,946	1,118,588	1,381,625	1,656,388
21	Maine	96,540	151,719	228,705	298,335	399,455	501,793	583,169	628,279	626,915	648,936	661,086	694,466	742,371
22	Maryland	319,728	341,548	380,546	407,350	447,040	470,019	583,034	687,049	780,894	934,943	1,042,390	1,188,044	1,295,346
23	Massachusetts	378,787	422,845	472,040	523,287	610,408	737,699	994,514	1,231,066	1,457,351	1,783,085	2,238,947	2,805,346	3,366,416
24	Michigan		3,757	4,762	7,452	28,004	212,267	397,654	749,113	1,184,059	1,636,937	2,093,890	2,420,982	2,810,173
25	Minnesota							6,077	172,023	439,706	780,773	1,310,283	1,751,394	2,075,708
26	Mississippi		7,600	31,306	75,448	136,621	375,651	606,526	791,305	827,922	1,131,597	1,289,600	1,551,270	1,797,114
27	Missouri			19,783	66,586	140,455	383,702	682,044	1,182,012	1,721,295	2,168,380	2,679,185	3,106,665	3,293,335
28	Montana									20,595	39,159	142,924	243,329	376,053
29	Nebraska								28,841	122,993	452,402	1,062,656	1,066,300	1,192,214
30	Nevada								6,857	42,941	62,266	47,355	42,335	81,875
31	New Hampshire	141,885	183,858	214,460	244,161	269,328	284,574	317,976	326,073	318,300	346,991	376,530	411,588	430,572
32	New Jersey	184,139	211,149	245,562	277,575	320,823	373,306	489,555	672,035	906,096	1,131,116	1,444,933	1,883,669	2,537,167
33	New Mexico							61,547	87,034	91,874	119,565	160,282	195,310	327,301
34	New York	340,120	589,051	959,049	1,372,812	1,918,608	2,428,921	3,097,394	3,880,735	4,382,759	5,082,871	6,003,174	7,268,894	9,113,614

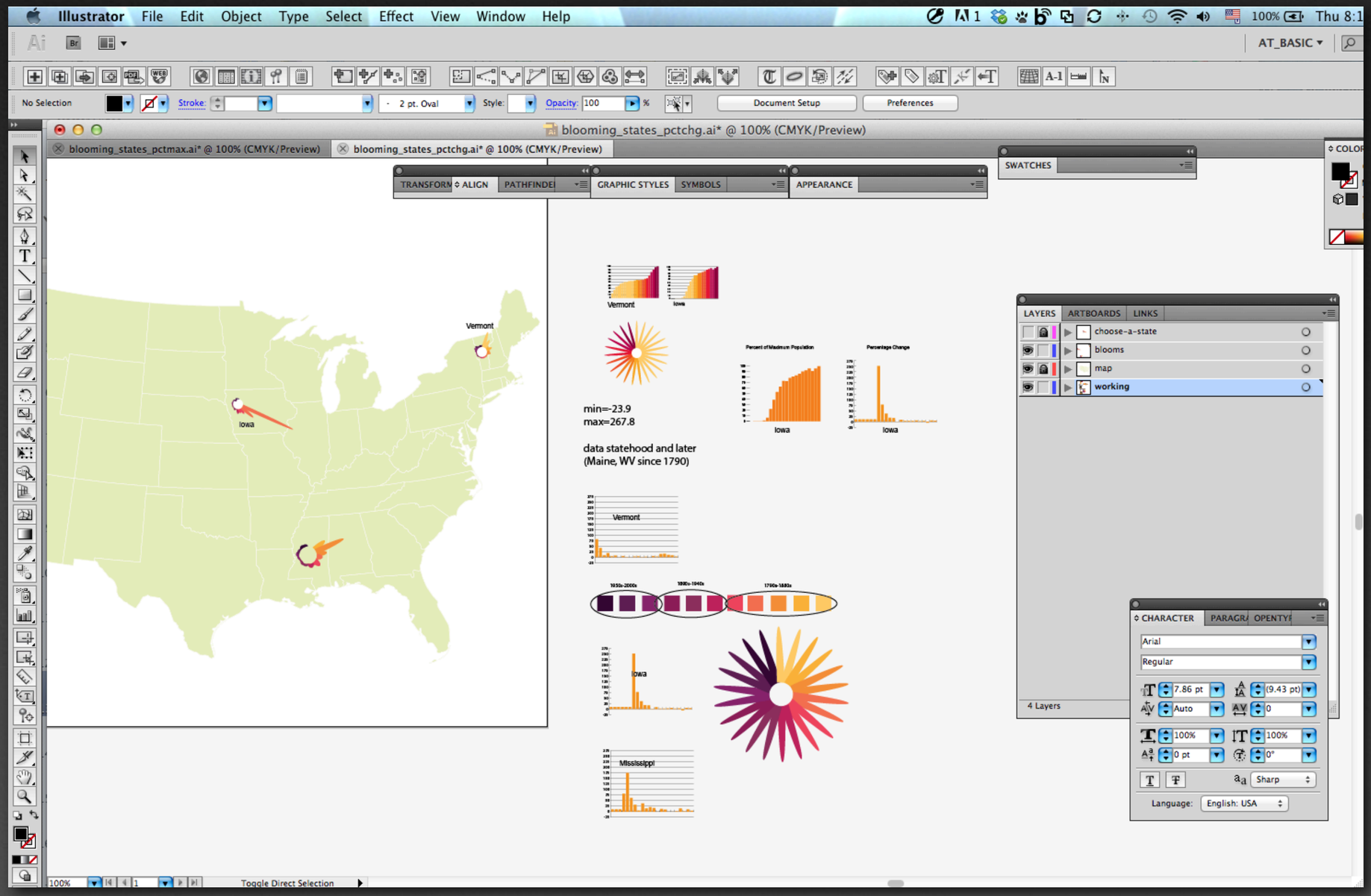
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	PCT CHG	1790s	1800s	1810s	1820s	1830s	1840s	1850s	1860s	1870s	1880s	1890s	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s
2	New York	73.2	62.8	43.1	39.8	26.6	27.5	25.3	12.9	16	18.1	21.1	25.4	14	21.2	7.1	10	13.2	8.7	-3.7	2.5	5.5	2.1
3	New Jersey	14.7	16.3	13	15.6	16.4	31.1	37.3	34.8	24.8	27.7	30.4	34.7	24.4	28.1	2.9	16.2	25.5	18.2	2.7	5	8.9	4.5
4	Pennsylvania	38.7	34.5	29.5	28.5	27.9	34.1	25.7	21.2	21.6	22.8	19.9	21.6	13.8	10.5	2.8	6	7.8	4.2	0.6	0.1	3.4	3.4
5	Maine	57.2	50.7	30.4	33.9	25.6	16.2	7.7	-0.2	3.5	1.9	5	6.9	3.5	3.8	6.2	7.9	6.1	2.4	13.4	9.2	3.8	4.2
6	New Hampshire	29.6	16.6	13.8	10.3	5.7	11.7	2.5	-2.4	9	8.5	9.3	4.6	2.9	5	5.6	8.5	13.8	21.5	24.8	20.5	11.4	6.5
7	Vermont	80.8	41.1	8.3	18.9	4	7.6	0.3	4.9	0.5	0	3.4	3.6	-1	2	-0.1	5.2	3.2	14	15.1	10	8.2	2.8
8	Massachusetts	11.6	11.6	10.9	16.6	20.9	34.8	23.8	18.4	22.4	25.6	25.3	20	14.4	10.3	1.6	8.7	9.8	10.5	0.8	4.9	5.5	3.1
9	Rhode Island		11.3	8	17	12	35.6	18.4	24.5	27.2	24.9	24	26.6	11.4	13.7	3.8	11	8.5	10.1	0	5.9	4.5	0.4
10	Connecticut	5.5	4.4	5.1	8.1	4.1	19.6	24.1	16.8	15.9	19.8	21.7	22.7	23.9	16.4	6.4	17.4	26.3	19.6	2.5	5.8	3.6	4.9
11	Ohio			152	61.3	62	30.3	18.1	13.9	20	14.8	13.2	14.7	20.8	15.4	3.9	15	22.1	9.7	1.4	0.5	4.7	1.6
12	Indiana				133.1	99.9	44.1	36.6	24.5	17.7	10.8	14.8	7.3	8.5	10.5	5.8	14.8	18.5	11.4	5.7	1	9.7	6.6
13	Illinois				185.2	202.4	78.8	101.1	48.4	21.2	24.3	26	16.9	15	17.7	3.5	10.3	15.7	10.2	2.8	0	8.6	3.3
14	Michigan						87.3	88.4	58.1	38.2	27.9	15.6	16.1	30.5	32	8.5	21.2	22.8	13.4	4.4	0.4	6.9	-0.6
15	Wisconsin								35.9	24.7	28.7	22.2	12.8	12.8	11.7	6.8	9.5	15.1	11.8	6.5	4	9.6	6
16	Minnesota								155.6	77.6	67.8	33.7	18.5	15	7.4	8.9	6.8	14.5	11.5	7.1	7.3	12.4	7.8
17	Iowa							251.1	76.9	36.1	17.7	16.7	-0.3	8.1	2.8	2.7	3.3	5.2	2.4	3.2	-4.7	5.4	4.1
18	Missouri					173.2	77.8	73.3	45.6	26	23.6	16	6	3.4	6.6	4.3	4.5	9.2	8.3	5.1	4.1	9.3	7
19	North Dakota											67.1	80.8	12.1	5.3	-5.7	-3.5	2.1	-2.3	5.7	-2.1	0.5	4.7
20	South Dakota											15.2	45.4	9	8.8	-7.2	1.5	4.3	-2.2	3.8	0.8	8.5	7.9
21	Nebraska									267.8	134.9	0.3	11.8	8.7	6.3	-4.5	0.7	6.5	5.1	5.8	0.5	8.4	6.7
22	Kansas									173.4	43.4	3	15	4.6	6.3	-4.3	5.8	14.3	3.1	5.2	4.8	8.5	6.1
23	Delaware	8.8	13.1	0.1	5.5	1.7	17.2	22.6	11.4	17.3	14.9	9.6	9.5	10.2	6.9	11.8	19.4	40.3	22.8	8.4	12.1	17.6	14.6
24	Maryland	6.8	11.4	7	9.7	5.1	24	17.8	13.7	19.7	11.5	14	9	11.9	12.5	11.6	28.6	32.3	26.5	7.5	13.4	10.8	9
25	District of Columbia		90	50.8	29.7	11.5	53.2	45.3	75.4	34.9	29.7	21	18.8	32.2	11.3	36.2	21	-4.8	-1	-15.6	-4.9	-5.7	5.2
26	Virginia	16.7	8.7	6.9	11.3	-1.8	9.2	9	0.5	23.5	9.5	12	11.2	12	4.9	10.6	23.9	19.5	17.2	15	15.7	14.4	13
27	West Virginia	40.7	34.2	29.7	29.3	26.9	34.6	24.6	17.3	39.9	23.3	25.7	27.4	19.9	18.1	10	5.4	-7.2	-6.2	11.8	-8	0.8	2.5
28	North Carolina	21.4	16.4	14.8	15.5	2.1	15.3	14.2	7.9	30.7	15.6	17.1	16.5	16	23.9	12.7	13.7	12.2	11.5	15.7	12.7	21.4	18.5
29	South Carolina	38.8	20.1	21.1	15.6	2.3	12.5	5.3	0.3	41.1	15.6	16.4	13.1	11.1	3.3	9.3	11.4	12.5	8.7	20.5	11.7	15.1	15.3
30	Georgia	97.1	54.5	35.6	51.6	33.8	31.1	16.7	12	30.2	19.1	20.6	17.7	11	0.4	7.4	10.3	14.5	16.4	19	18.6	26.4	18.3
31	Florida							60.6	33.7	43.5	45.2	35	42.4	28.7	51.6	29.2	46.1	78.7	37.1	43.6	32.7	23.5	17.6
32	Kentucky		84	38.8	21.9	13.4	26	17.6	14.3	24.8	12.7	15.5	6.6	5.5	8.2	8.8	3.5	3.2	5.9	13.7	0.7	9.7	7.4
33	Tennessee		147.8	61.6	61.3	21.6	20.9	10.7	13.4	22.6	14.6	14.3	8.1	7	11.9	11.4	12.9	8.4	10	17	6.2	16.7	11.5
34	Alabama				142	90.9	30.6	25	3.4	26.6	19.9	20.8	16.9	9.8	12.7	7.1	8.1	6.7	5.4	13.1	3.8	10.1	7.5
35	Mississippi				81.1	175	61.5	30.5	4.6	36.7	14	20.3	15.8	-0.4	12.2	8.7	-0.2	0	1.8	13.7	2.1	10.5	4.3
36	Arkansas						115.1	107.5	11.3	65.6	40.6	16.3	20	11.3	5.8	5.1	-2	-6.5	7.7	18.9	2.8	13.7	9.1
37	Louisiana				40.6	63.4	46.9	36.7	2.7	29.3	19	23.5	19.9	8.6	16.9	12.5	13.5	21.4	11.8	15.5	0.3	5.9	1.4
38	Oklahoma													22.4	18.1	-2.5	-4.4	4.3	9.9	18.2	4	9.7	8.7
39	Texas							184.2	35.5	94.5	40.4	36.4	27.8	19.7	24.9	10.1	20.2	24.2	16.9	27.1	19.4	22.8	20.6
40	Montana											70.3	54.5	46	-2.1	4.1	5.6	14.2	2.9	13.3	1.6	12.9	9.7
41	Idaho												101.3	32.6	3	17.9	12.1	13.3	6.8	32.5	6.7	28.5	21.1
42	Wyoming												57.7	33.2	16	11.2	15.9	13.6	0.7	41.3	-3.4	8.9	14.1
43	Colorado										112.7	30.6	48	17.6	10.2	8.4	18	32.4	25.8	30.9	14	30.6	16.9
44	New Mexico														17.5	25.6	28.1	39.6	6.8	28.2	16.3	20.1	13.2
45	Arizona														30.3	14.6	50.1	73.7	36	53.5	34.8	40	24.6

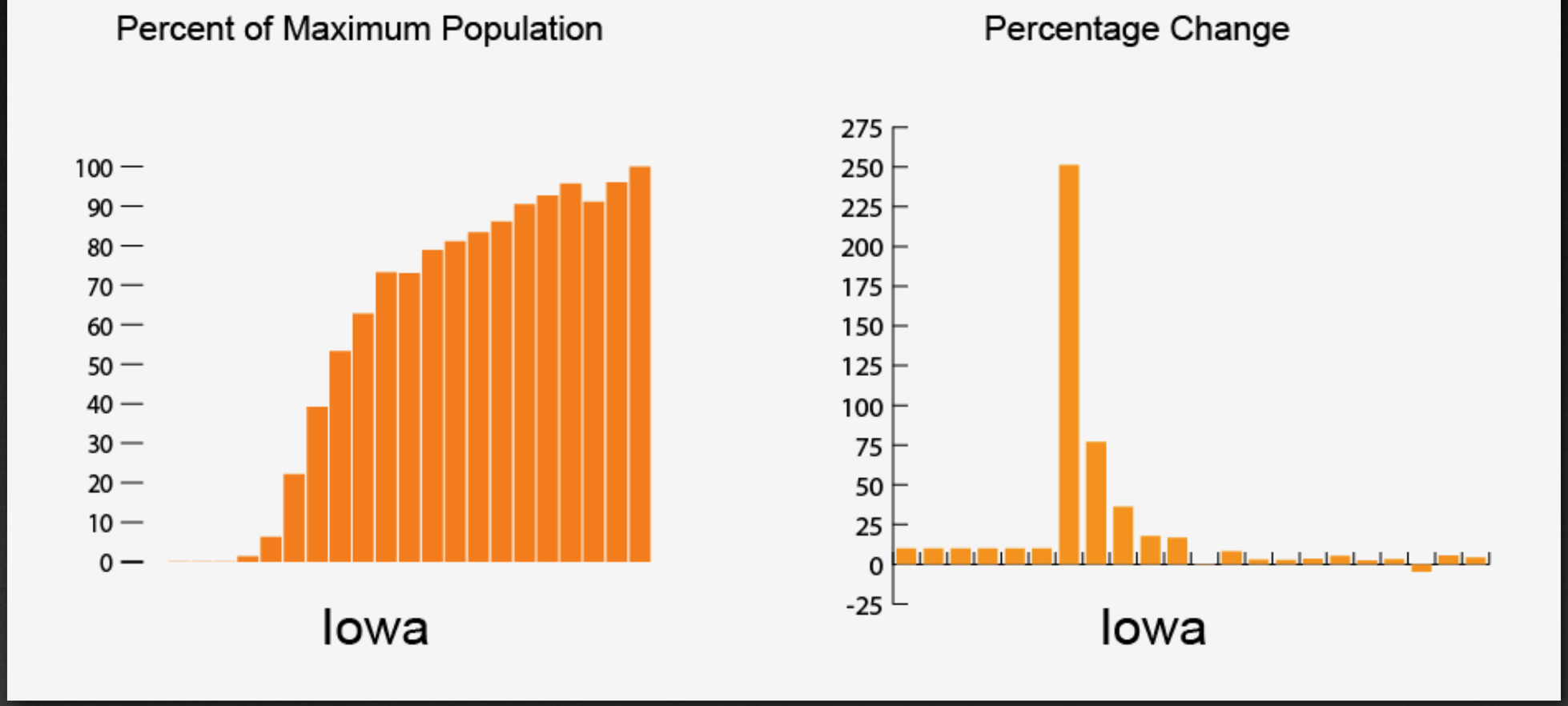
30	Nevada													6,857	42,941	62,266	47,355	42,335	81,875				
31	New Hampshire	141,885	183,858	214,460	244,161	269,328	284,574	317,976	326,073	318,300	346,991	376,530	411,588	430,572									
32	New Jersey	184,139	211,149	245,562	277,575	320,823	373,306	489,555	672,035	906,096	1,131,116	1,444,933	1,883,669	2,537,167									
33	New Mexico							61,547	87,034	91,874	119,565	160,282	195,310	327,301									
34	New York	340,120	589,051	959,049	1,372,812	1,918,608	2,428,921	3,097,394	3,880,735	4,382,759	5,082,871	6,003,174	7,268,894	9,113,614									

International
Mapping

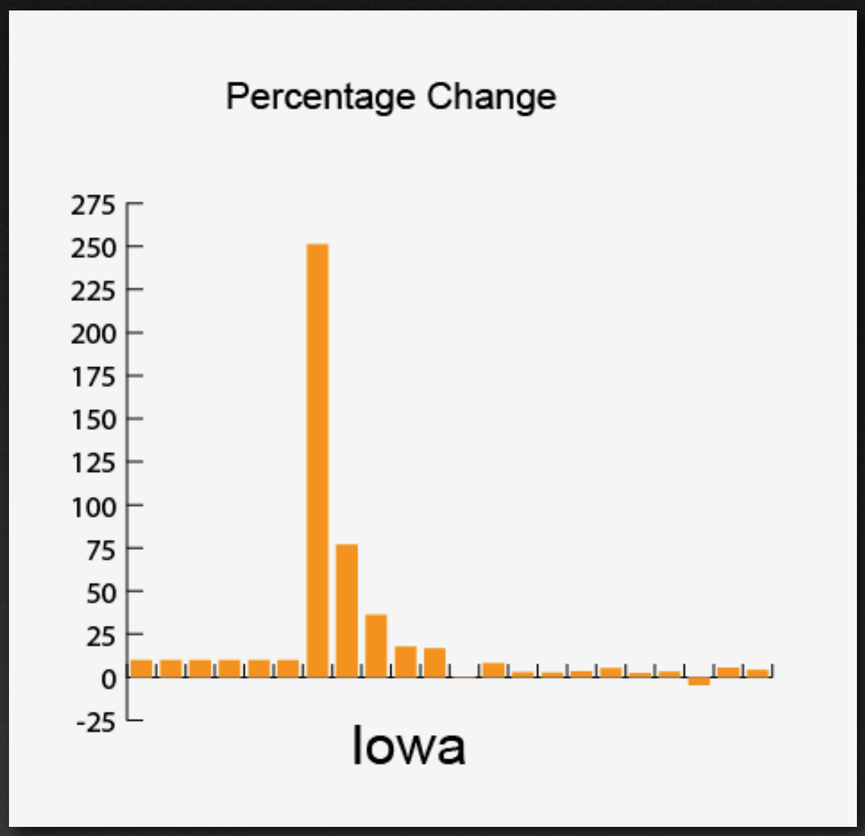
3. Rough Graphics

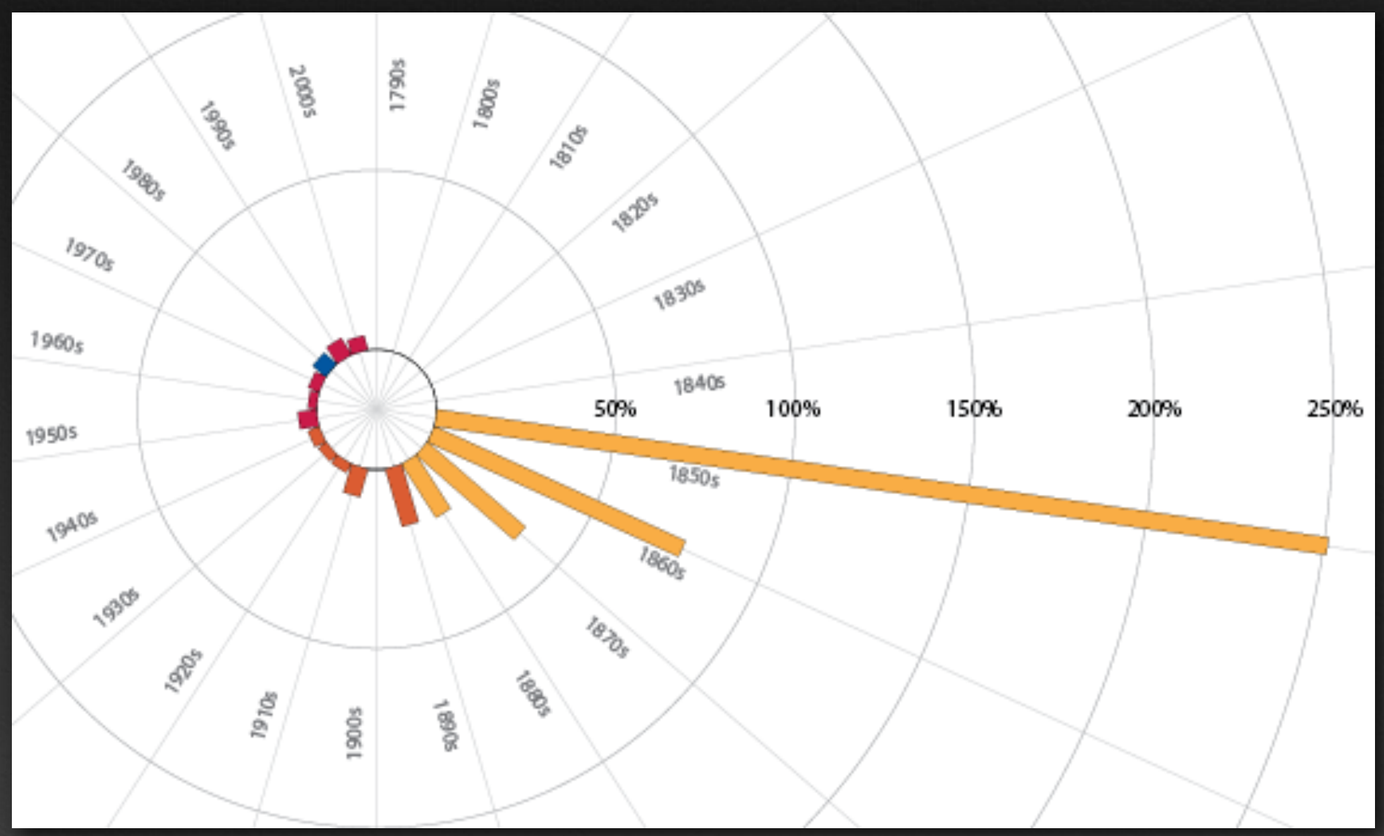
Tools: Excel, ArcGIS, Illustrator





Refined question: percent of maximum versus percentage change?

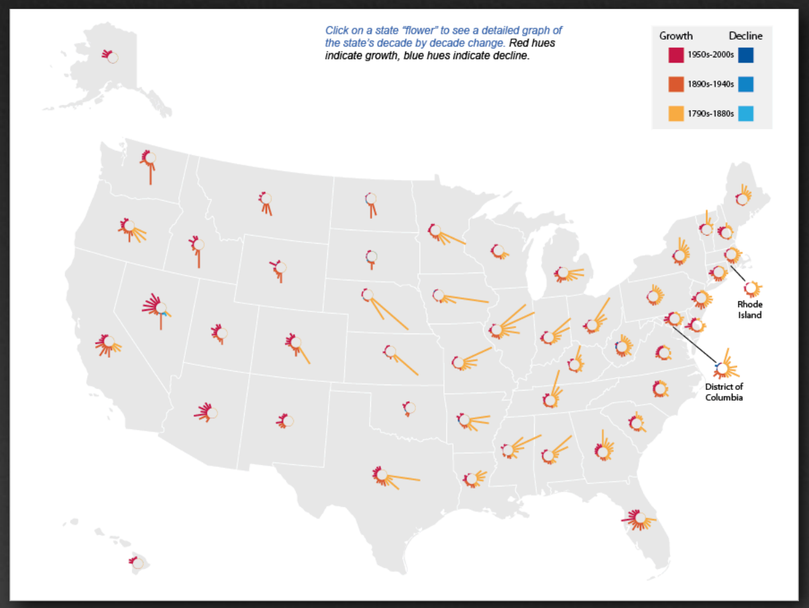




Refined visual: standard bar chart versus radial bar chart (direction = time period)

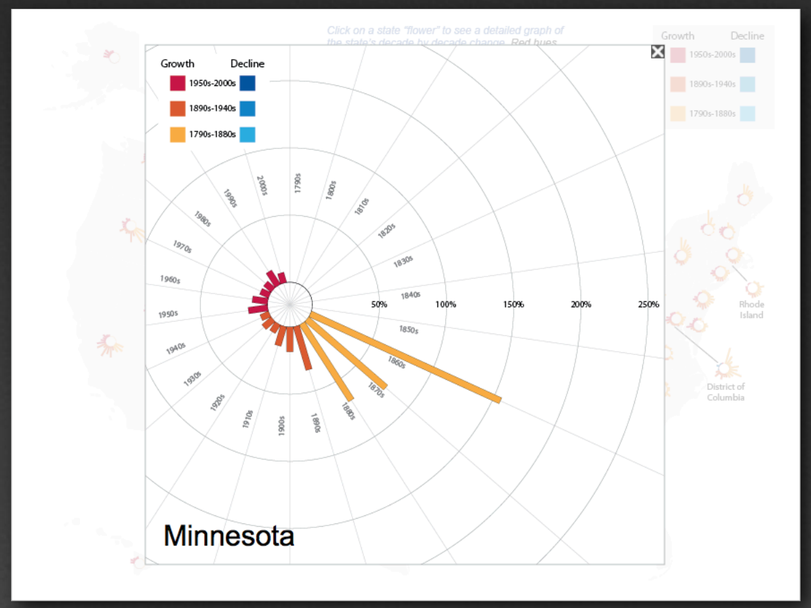
4. Storyboard

Tools: Illustrator, Acrobat



Opening map

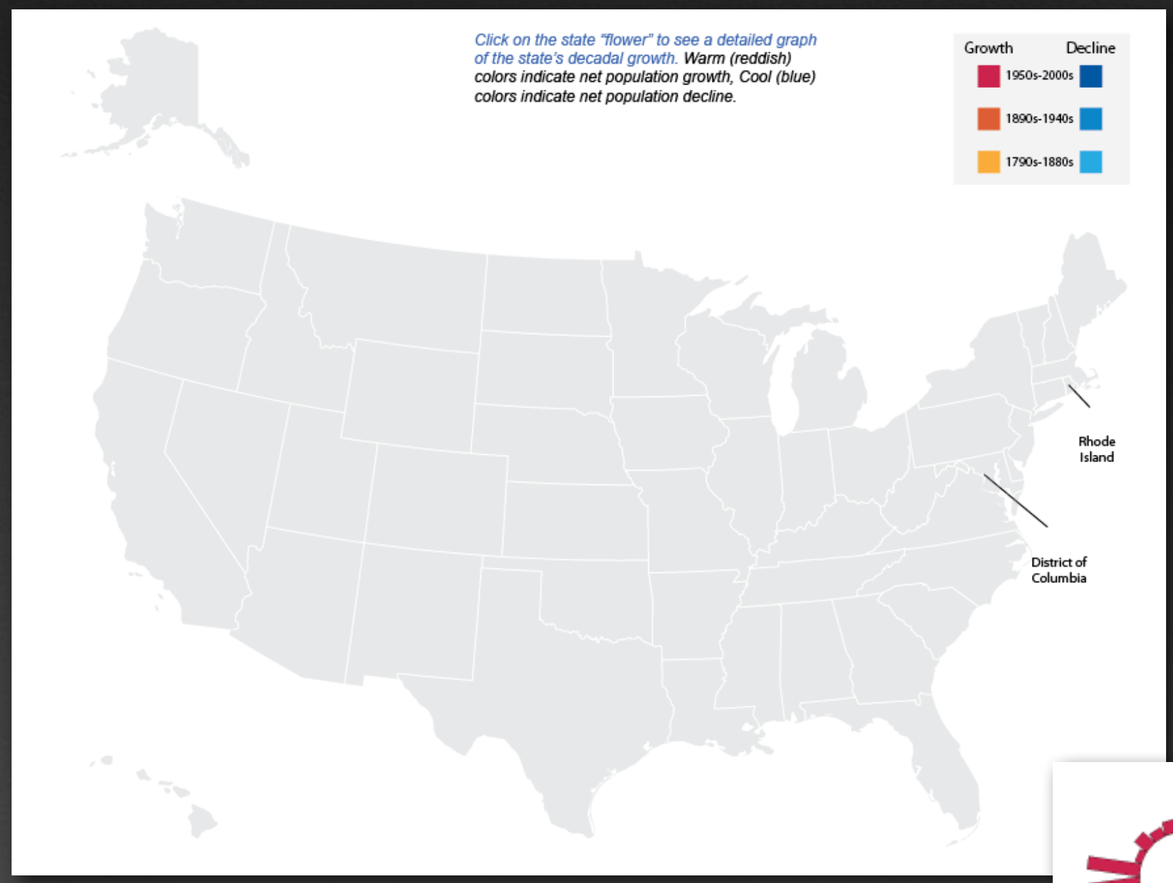
Mouseover

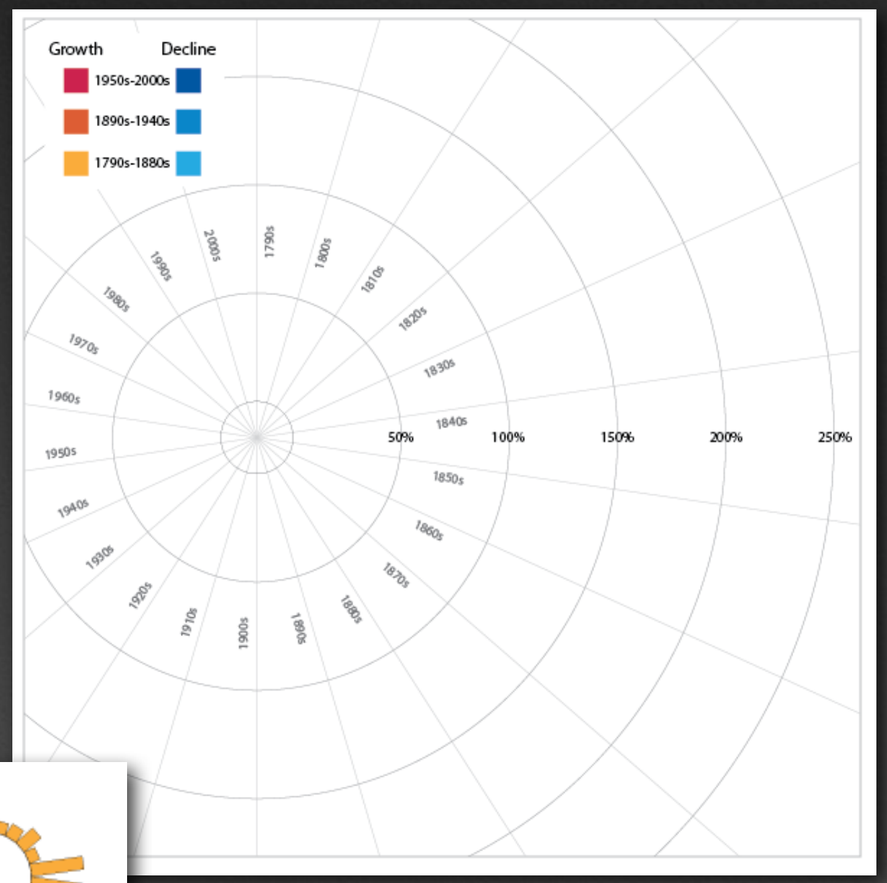


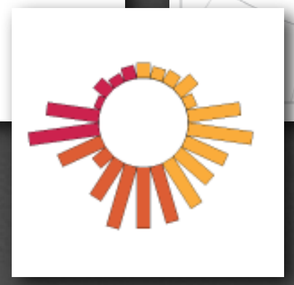
Pop up box

5. Final Graphics

Tools: Illustrator, Photoshop

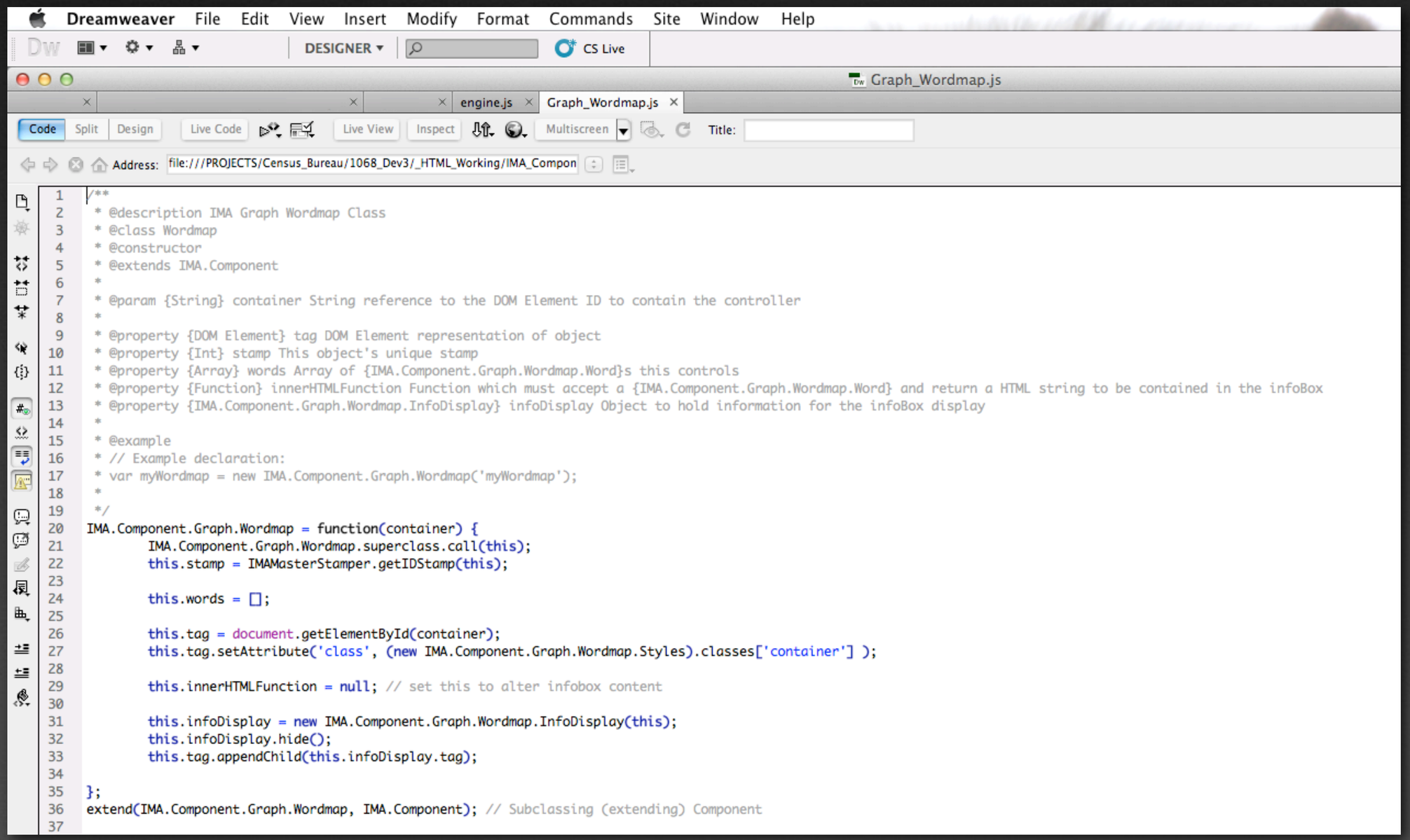






6. Code Development

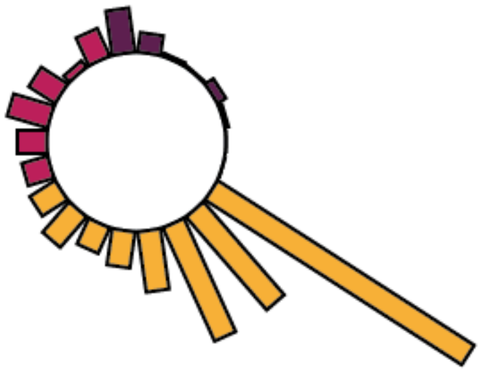
Tools: Dreamweaver, Adobe Extendedscript Toolkit

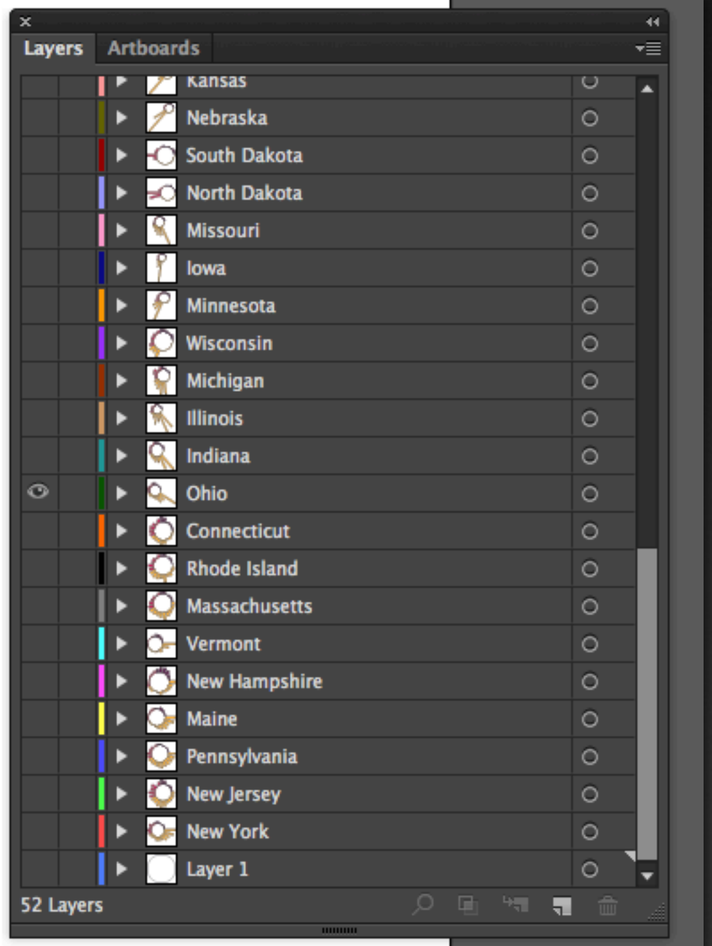


Create Multiple Flower Graphs.jsx

ExtendScript Toolkit CS6 | main

```
174
175  function createMultiGraphs() {
176
177      var shouldCreateNewLayers = Window1.ckbDistributeToLayers.value;
178      var firstRowIsHeader = Window1.ckbFirstRowIsHeader.value;
179
180      var flowerData = getDataSetArrayFromString(Window1.Group5.grpData.txbDataField.text);
181
182      var usingColors = ( Window1.Group5.grpColors.txbColors.text != "" );
183      var flowerColors;
184      usingColors ? flowerColors = parseColors(Window1.Group5.grpColors.txbColors.text
185
186      var maxValue;
187      if( Window1.grpMaxOverride.txbMaxOverride.text != "" ) {
188          maxValue = Number(Window1.grpMaxOverride.txbMaxOverride.text);
189      } else {
190          maxValue = flowerData.max();
191          alert("Using Max value of: " + maxValue);
192      }
193
194      var origCircle = app.activeDocument.selection[0];
195      var flowerLayer = app.activeDocument;
196
197      for( var i = 0; i < flowerData.length; i++ ) {
198          var layerTitle;
199          firstRowIsHeader ? layerTitle = flowerData[i].shift() : layerTitle = ("Flower " + i)
200          shouldCreateNewLayers ? flowerLayer = createNewLayer(layerTitle) : null
201          var theCircle = app.activeDocument.pathItems.ellipse(origCircle.top, origCircle.le
202          createGraph( flowerData[i], theCircle, flowerLayer, maxValue, flowerColors );
203      }
204
205  }
206
207  function checkIfColorsDataIsWellFormed( colorsString ) {
208      var colorsArray = colorsString.split("\n");
209      var colorPropertiesArray = colorsArray[0].split(",");
210      if( colorPropertiesArray.length == 3 ) {
211          return true;
212      } else {
213          return false;
214      }
215  }
216
217  function parseColors( colorsString ) {
218      var colorsList = []; // contains the colors
219      var colorsStringArray = colorsString.split("\n");
220      for( var i = 0; i < colorsStringArray.length; i++ ) {
221          var colorPropertiesArray = colorsStringArray[i].split(",");
222          var theColor = new RGBColor();
223          theColor.red = Number(colorPropertiesArray[0]);
224          theColor.green = Number(colorPropertiesArray[1]);
225          theColor.blue = Number(colorPropertiesArray[2]);
226          colorsList.push(theColor);
227      }
228      return colorsList;
229  }
230
231  function createNewLayer( layerName ) {
232      var newLayer = app.activeDocument.layers.add();
233      newLayer.name = layerName;
234      return newLayer;
235  }
236
```





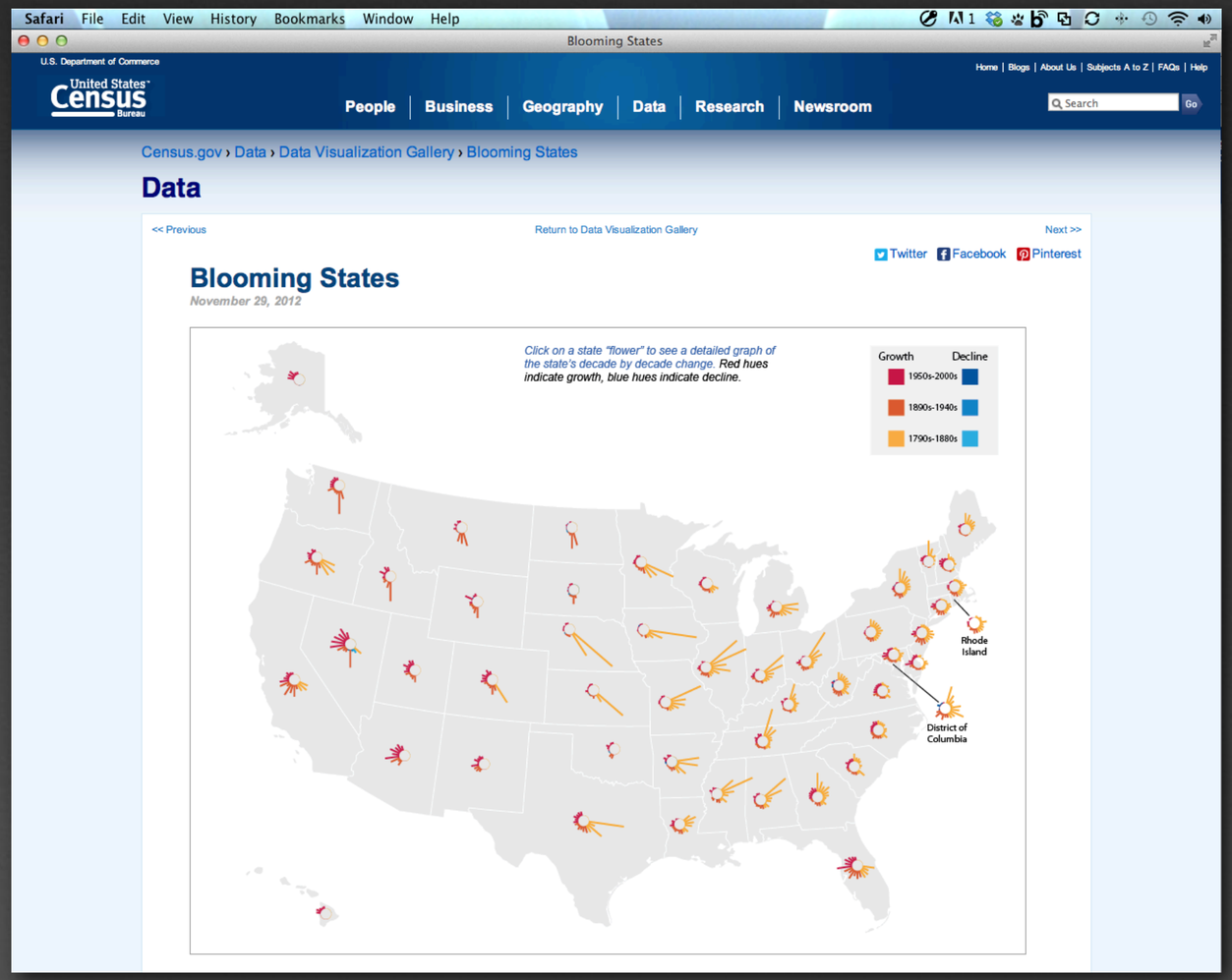
International Mapping

7. Web Presentation

Tools: Dreamweaver

Browsers:

- Internet Explorer
- Safari
- Firefox
- Chrome



Tips: CONCEPT

- Discuss concepts out loud with others
- Gather visual ideas
- Include developer/programmer in the early stages
- Don’t shortcut brainstorming

Tips: PRODUCTION

- Copy and paste from Excel to Illustrator
- Create simple graphs in Illustrator
- Create a library widgets
- Don’t review digital products by printing them out!

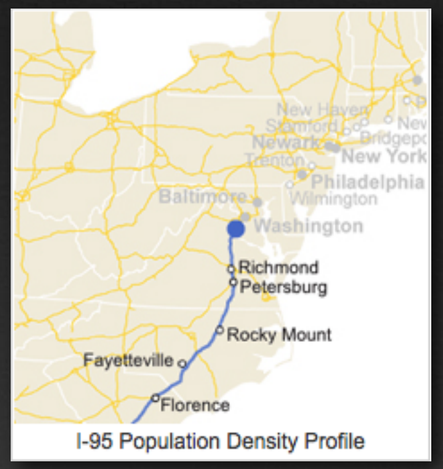
Tips: PROCESS

- Be sure you have an iterative creative process
- Create, review, revise, review, revise...
- Generate lots of visual ideas because you should probably kill at least 1/2 of them

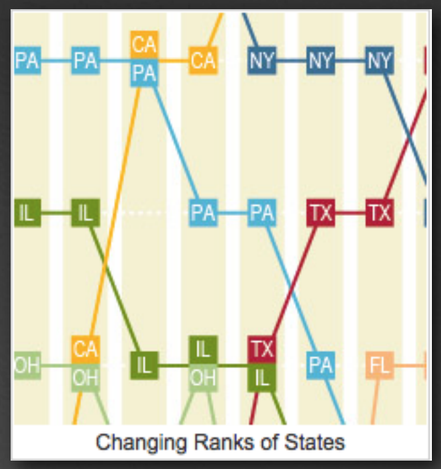
Samples from the gallery

Top 20 Cities


Gaining and Losing Shares



I-95 Population Density Profile



Changing Ranks of States

Population Bracketology

< explore: Top 20 Cities, Gaining and Losing Shares, I-95 Population Density Profile, Changing Ranks and States, Bracketology >

Questions?

Alex Tait
International Mapping, Ellicott City, MD
443-367-0050 x231
alex@internationalmapping.com